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मानक

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“Step Out From the Old to the New”

IS 14886 (2000): Switch Mode Power Supply [LITD 16:
Computer Hardware, Peripherals and Identification Cards]



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“Knowledge is such a treasure which cannot be stolen”

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भारतीय मानक

स्विच मोड पावर सप्लाय — विशिष्टि

Indian Standard

SWITCH MODE POWER SUPPLY — SPECIFICATION

ICS 31.220.20

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Computer Hardware Sectional Committee had been approved by the Electronics and Telecommunication Division Council.

The objective of this standard is to lay down performance requirements for ensuring quality and reliability of Switch Mode Power Supplies (SMPS) to be used with personal computers and peripherals, such as printer, video monitor, floppy disk drives and secondary storage devices. The standard is designed to serve the public interest through eliminating misunderstandings between manufacturers and purchasers, facilitating interchangeability and improvement of products and assisting the purchaser in selecting and obtaining with minimum delay, the proper product for his particular need.

For optimum performance and to accelerate the growth with increased productivity, certain minimum quality control procedures are to be adopted by the manufacturers of SMPS.

The technical committee responsible for the preparation of this standard has reviewed the provisions of the following IEC Publication and has decided that it may be used in conjunction with this standard to carry out tests given in 6.2(c) of this standard till Indian Standard on this subject is published.

IEC 61000 (Part 4/Sec 5) : 1995 Electromagnetic compatibility (EMC) : Part 4 Testing and measurement techniques—Section 5 : Surge immunity test

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

SWITCH MODE POWER SUPPLY — SPECIFICATION

1 SCOPE

1.1 This standard lays down general and performance requirements for switch mode power supply (SMPS) to be used with personal computers (PC) and peripherals such as printer, video monitor and floppy disk drive and other secondary storage devices.

2 REFERENCES

2.1 The Indian Standards indicated in Annex A contain provisions which through reference in this text, constitute provision of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated in Annex A.

3 TERMINOLOGY

3.1 For the purpose of this standard, the terms and definitions as given in IS 7204 (Part 1) shall apply.

4 GENERAL REQUIREMENTS

4.1 The SMPS shall be easily detachable from the personal computer/peripherals or provision should exist for incorporating the same on main PCB. The SMPS unit shall be self-contained. The input power cable shall reach the unit directly. The dc outputs shall be taken from connectors mounted on chassis of the SMPS. The fuse shall also be mounted on the unit. The power shall be drawn to the SMPS using 3-wire systems.

5 SAFETY REQUIREMENTS

5.1 The SMPS shall conform to safety requirements. These tests shall be carried out in accordance with IS 13252 and shall meet the requirements specified therein for following tests:

- a) Earth leakage current test shall be carried out according to 5.2 of IS 13252.
- b) Dielectric test as per 5.3 of IS 13252, and
- c) Short circuit protection shall also be provided.

6 EMI/EMC REQUIREMENTS

6.1 The conducted emission and the radiated emission shall be limited to the requirements specified in Table 2, Table 4 and Table 6 for Class B equipment in IS 6873 (Part 7).

6.2 Conducted Susceptibility Test

The following tests shall be carried out:

- a) *Electrostatic Discharge Test* — As per IS 14700 (Part 4/Sec 2);
- b) *Electrical Fast Transient/Burst Test* — As

per IS 14700 (Part 4/Sec 4); and

- c) *Surge/Spike Test* — As per IEC 61000 (Part 4/Sec 5):1995.

7 PERFORMANCE REQUIREMENTS

7.1 The SMPS shall meet the performance requirements as laid down in Table 1.

Table 1 Performance Requirements

Sl No. Characteristics	Requirements
i) Visual examination	The SMPS shall be free from workmanship defects, sharp edges, nicks, scratches, burrs etc. All the fasteners shall be fixed properly
ii) Line effect	$\pm 1\%$ output regulation for 180-264 Vac input variation
iii) Power output	200 W (Max)
iv) Output voltage	+ 5V/4 – 20A; +12V/2 – 8A; –5V/0 – 0.5A; – 12V/0 – 0.5A + 5V/ $\pm 3\%$; All others/ $\pm 5\%$
v) Load regulation for a variation of load from Min to Max load and vice-versa for the output under test and outputs at 50 percent load	
vi) Efficiency at nominal input and rated load	70% Min
vii) Periodic and random deviation (PARD) measured peak-to-peak at rated load	+5V/50 mV; +12V/120 mV; – 5V/100 mV; –12V/150 mV
viii) Dynamic load regulation load change from Min to Max rated load	+5V/ ± 3 ; All others / $\pm 5\%$
ix) Effect of power interruption	No output dropout for 0.5 cycle (10 ms) input loss
No. of power interruption and the rate of interruption	The unit shall withstand when the power is interrupted for 100 times at the rate of 6 operations per minute
x) Cross regulation (The output under test shall be loaded at 50% and the other loads shall be varied from minimum load to full load)	+5V/ $\pm 1\%$; +12V/ $\pm 5\%$ All others/ $\pm 10\%$
xi) Overload protection	Provided for all outputs (foldback/shutdown type)
xii) In-rush current at rated input voltage	20A peak (Max)
xiii) Hold up time at rated load and minimum input voltage	20 ms (Min)
xiv) Power good signal (optional):	
a) Signal level:	STD. TTL
b) Time on delay:	100-500 ms
	While switching on the ac input, the power cut signal shall become high after +5V output reaches 4.75V with a delay tolerance which lie between 100 to 500 ms.

8 MARKING

8.1 Each product shall be legibly and indelibly marked at least with the following:

- Manufacturer's name or trade-mark,
- Model designation,
- Country of manufacture,
- Voltage range,
- Fuse and its rating (preferable readily accessible to the user),
- Input/output points,
- Additional marking such as high voltage points with their voltage range,
- Frequency of operation,
- Earthing terminal, and
- ON/OFF switch marking.

Compliance is checked by inspection and by rubbing the marking by hand for 15 s with a piece of cloth soaked with water and again for 15 s with a piece of cloth soaked with kerosene. After the test the marking shall be legible; it shall not be easily possible to remove marking plates and they shall show no curling.

8.2 The SMPS may also be marked with the Standard Mark.

8.2.1 The use of the Standard Mark is governed by the provisions of *Bureau of Indian Standards Act, 1986* and the rules and regulations made thereunder. Details of conditions under which a license for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

9 OPERATING AND INSTRUCTION MANUAL

9.1 An instruction manual containing information relating to installation, operation, routine maintenance and safety precaution shall be made available with each SMPS.

9.2 On request, authorised maintenance agency shall be provided with circuit diagram, components and parts identification and layout.

10 TESTS

10.1 Classification of Tests

10.1.1 Type Tests

The tests specified in Table 2 shall constitute type tests and shall be carried out in the sequence mentioned therein.

10.1.1.1 Number of samples

For type tests, number of samples shall be three of the same model, type and make of the SMPS selected preferably at random from a regular product lot. The

samples shall be distributed for various tests as specified in Table 2.

10.1.1.2 Criteria for acceptance

There shall be no failure in any of type tests, in case of failure, twice the number of samples shall be taken and subjected to the tests in which failure has occurred and other tests that have bearing on the test results. No failure shall be permitted in the retests.

10.1.2 Routine Tests

The following shall constitute the routine tests:

- Check the operation of SMPS using target load.
- Check performance requirements as per Table 1 [SI No. (ii), (vii) and (ix)].
- Check safety aspects as given in 5.1.

10.1.3 Acceptance Tests

The following shall constitute the acceptance tests:

- Check as per 4, 5, 6 and 8.
- Check as per Table 1.

The sampling plan and acceptable quality level (AQL) shall be as agreed to between the manufacturer and the buyer and shall be selected from IS 10673.

Table 2 Schedule of Type Tests
(Clauses 10.1.1 and 10.1.1.1)

Group	Test	Clause Ref of This Standard	No. of Samples
0	Check for general requirements	4	3
	Check for performance requirements	Table 1	
	Check for EMI/EMC requirements	6	
	Check for safety requirements	5	
	Check for marking requirements	8	
1	Drop (Free Fall) Test	10.2.1	1
	Bump Test	10.2.2	
2	Vibration Test	10.2.3	1
	Dry Heat Test	10.2.4	
	Damp Heat Test	10.2.5	
	Cold Test	10.2.6	
3	Burn-in Test	10.2.7	1

10.2 Environmental Tests

10.2.1 Free Fall Test

The SMPS shall be subjected to free fall test from a height of 25 mm in accordance with IS 9000 (Part 7/ Sec 4). Total number of falls shall be 8 (4 corners + 4 edges) in unpacked condition.

10.2.2 Bump Test

The SMPS in unpacked condition with power OFF shall be subjected to Bump Test carried out in accordance with IS 9000 (Part 7/Sec 2), the number of bumps being 1 000 and with acceleration 40 g under packed condition.

10.2.3 Vibration Test

The SMPS in unpacked condition with power OFF shall be subjected to vibration test at a frequency of 10 to 55 Hz and acceleration 1 g for 45 min on each axis (X, Y, Z) in accordance with IS 9000 (Part 8).

10.2.4 Dry Heat Test

The SMPS in unpacked condition with power OFF shall be subjected to dry heat test of severity of 55°C for 16 h in accordance with IS 9000 (Part 3/Sec 5).

10.2.5 Damp Heat (Cyclic)

The SMPS in unpacked condition with power OFF shall be subjected to damp heat cyclic test carried out in accordance with IS 9000 (Part 5/Sec 1), at a temperature of 40°C and relative humidity of 90 percent for two cycles.

10.2.6 Cold Test

The SMPS in unpacked condition with power OFF shall be subjected to cold test of severity of 10°C for 2 h carried out in accordance with IS 9000 (Part 2/Sec 4). The duration of recovery shall be 1 to 2 h. To avoid condensation, equipment to be brought to ambient temperature in a controlled environment.

10.2.7 Burn-in Test

The SMPS shall be subjected to burn-in test at a temperature of 45°C for 48 h in power ON condition.

10.2.8 After each environmental test, the functional performance as given in Table 1 shall be performed after recovery of 1 to 2 h.

ANNEX A*(Clause 2.1)***LIST OF REFERRED INDIAN STANDARDS**

<i>IS No.</i>	<i>Title</i>	<i>IS No.</i>	<i>Title</i>
6873 (Part 7) : 1999	Limits and methods of measurements of radio disturbance characteristics: Part 7 Information technology equipment (<i>first revision</i>)	(Part 7/Sec 4) : 1979	Impact test, Section 4 Free fall
7204 (Part 1) : 1974	Stabilized power supplies dc output: Part 1 Terms and definitions	(Part 8) : 1981	Vibration (sinusoidal) test
9000	Basic environmental testing procedures for electronic and electrical items:	10673 : 1983	Sampling plans and procedures for inspection by attributes for electronic items
(Part 2/Sec 4) : 1977	Cold test, Section 4 Cold test for heat dissipating items with gradual change of temperature	13252 : 1992	Safety of information technology equipment including electrical business equipment
(Part 3/Sec 5) : 1977	Dry heat test, Section 5 Dry heat test for heat dissipating items with gradual change of temperature	14700	Electromagnetic compatibility (EMC):
(Part 5/Sec 1) : 1981	Damp heat (cyclic) test, Section 1 16 + 8 h cycle	(Part 4/Sec 2) : 1999	Testing and measurement techniques, Section 2 Electrostatic discharge immunity test
(Part 7/Sec 2) : 1979	Impact test, Section 2 : Bump	(Part 4/Sec 4) : 1999	Testing and measurement techniques, Section 4 Electrical fast transient/burst immunity test

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Amendments Issued Since Publication

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